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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/077,207	05/26/1998	SATOSHI INOUE	JAO40840	5738

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EXAMINER
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PRENTY, MARK V

ART UNIT	PAPER NUMBER
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2822

DATE MAILED: 04/15/2003

31

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.  
**09/077,207**

Applicant(s)  
**INOUE et al.**

Examiner  
**Prenty**

Art Unit  
**2822**



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE three MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on Mar 28, 2003
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 25, 26, 30, 31, 33-36, 38-44, and 47-61 is/are pending in the application.
- 4a) Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 25, 39, 43, 44, 47-57, 59, and 60 is/are allowed.
- 6) ☒ Claim(s) 26, 30, 31, 33-36, 38, 40-42, 58, and 61 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some\* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

This Office Action is in response to the amendment filed March 28, 2003.

On April 10, 2003, applicant's representative George Simion (Reg. No. 47,089) telephonically requested another personal interview for this application. The examiner denied Mr. Simion's request, for at least two reasons. First, Mr. Simion and the examiner already had a personal interview for this application on December 18, 2002 (see Paper 26 mailed December 24, 2002, hereby incorporated by reference). Furthermore, the applicant had already filed a response to the Office Action mailed December 31, 2002 (see Paper 29 filed March 28, 2003, hereby incorporated by reference), and that response was presumably complete.

Claim 61 is rejected under 35 U.S.C. §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Specifically, dependent claim 61, which depends on independent claim 26, is rejected because the specification does not describe a thin film transistor comprising a channel region including an extension in a channel width direction and a gate electrode formed over the channel region and covering up the extension, wherein heat generated in the channel region is radiated through the gate electrode. Rather, the specification discloses that the heat generated in the channel region of independent claim 26's transistor, which is directed to Fig. 3, is radiated through channel extensions 171 themselves. See the specification at pages 12-13. Note also the specification's description (at pages 13-14) of Fig. 4's heat-radiating source/drain extensions 123.

Claim 61 is rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter

which applicant regards as the invention.

First, claim 61's "a channel region" should read "the channel region."

Furthermore, claim 61 is incorrect in reciting "wherein heat generated in [the] channel region is radiated through the gate electrode." Independent claim 26, on which claim 61 depends, is directed to the Fig. 3 disclosure, and that disclosure discloses that heat generated in channel region 17 is radiated through the heat-radiating channel extensions 171. See the specification's description of Fig. 3 at pages 12-13.

Claims 26, 30, 31, 33, 34 and 61 are rejected under 35 U.S.C. §103(a) as obvious over Cherne et al. (United States Statutory Invention Registration H1435, already of record) together with Han et al. (United States Patent 5,920,085, already of record) and Kerber et al. (United States Patent 5,623,155, already of record).

With respect to independent claim 26, Cherne et al. disclose a thin film transistor (see the entire reference, particularly the Figs. 3-4 disclosure), comprising: a silicon film in which a channel region 14 is formed, the channel region including an extension 31 (or 32) in a channel width direction; a gate electrode 21 formed over the channel region and covering up the extension; a gate insulating film 22 provided between the channel region and the gate electrode; and a source-drain region 16 (or 18) connected to said channel region.

There are two differences between Cherne et al's thin film transistor and independent claim 26's thin film transistor.

The first difference between Cherne et al's thin film transistor and claim 26's thin film transistor is their gate electrodes comprise polysilicon and a material "exhibiting higher thermal conductivity than that of the silicon film" (i.e., a metal), respectively.

The second difference between Cherne et al's thin film transistor and claim 26's thin film transistor is claim 26 recites source, drain and gate wirings electrically connected to the source region, drain region and gate electrode, respectively (Cherne et al. do not explicitly disclose source, drain and gate wirings electrically connected to its source region, drain region and gate electrode, respectively).

With respect to the first difference, Han et al. teach forming a thin film transistor's gate electrode of polysilicon or metal (see column 1, lines 50-60).

It would have been obvious to one skilled in this art to form Cherne et al's thin film transistor's gate electrode 21 of metal, rather than polysilicon, because metal and polysilicon are used interchangeably for a thin film transistor's gate electrode, as taught by Han et al.

With respect to the second difference, Kerber et al. illustrate that a thin film transistor's source region, drain region and gate electrode are conventionally provided with wirings (see column 3, lines 22-43).

It would have also been obvious to one skilled in this art to provide Cherne et al's thin film transistor with source, drain and gate wiring layers electrically connected to its source region, drain region and gate electrode, respectively, as is conventionally done, as illustrated by Kerber et al.

Claim 26 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Cherne et al. together with Han et al. and Kerber et al.

With respect to dependent claim 30, Kerber et al. illustrate that a gate wiring is conventionally electrically connected to one end of the gate electrode through at least one contact hole (see column 3, lines 22-43).

Claim 30 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over

Cherne et al. together with Han et al. and Kerber et al.

With respect to dependent claim 31, Kerber et al. illustrate that a source/drain wiring is conventionally electrically connected to a source/drain region through at least one contact hole (see column 3, lines 22-43).

Claim 31 is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Cherne et al. together with Han et al. and Kerber et al.

With respect to dependent claims 33 and 34, Cherne et al's discloses extends to CMOS transistors (see the title of the invention, for example).

Claims 33 and 34 are thus rejected under 35 U.S.C. §103(a) as being unpatentable over Cherne et al. together with Han et al. and Kerber et al.

With respect to dependent claim 61, heat generated in Cherne's channel region is radiated through channel extensions 31 and 32.

Claim 61, at least in view of the 35 U.S.C. §112 rejections thereof, is thus rejected under 35 U.S.C. §103(a) as being unpatentable over Cherne et al. together with Han et al. and Kerber et al.

Claims 35, 36, 38, 40-42 and 58 are rejected under 35 U.S.C. §103(a) as being unpatentable over Cherne et al. (United States Statutory Invention Registration H1435, already of record) together with Han et al. (United States Patent 5,920,085, already of record), Kerber et al. (United States Patent 5,623,155, already of record) and Koyama et al. (United States Patent 5,616,935, already of record).

Specifically, the difference between the obvious Cherne et al./Han et al./Kerber et al. (C)MOS thin film transistors (explained above) and the set of rejected claims is the latter's (C)MOS thin film transistors are used in various devices.

Koyama et al. teach that "Complementary circuits using TFTs are conventionally

used to drive an active matrix type liquid crystal display device, an image sensor, and the like" (column 1, lines 15-17).

It would have been further obvious to one skilled in this art to use the obvious Cherne et al./Han et al./Kerber et al. complementary thin film transistors "to drive an active matrix type liquid crystal display device, an image sensor, and the like," as taught by Koyama et al.

Claims 35, 36, 38, 40-42 and 58 are thus rejected under 35 U.S.C. §103(a) as being unpatentable over Cherne et al. together with Han et al., Kerber et al. and Koyama et al.

Claims 25, 39, 43, 44, 47-57, 59 and 60 are apparently allowable over the prior art of record.

The applicant's arguments with respect to the maintained rejection of claims 26, 30, 31, 33 and 34 under 35 U.S.C. §103(a) as obvious over Cherne et al. together with Han et al. and Kerber et al. are not persuasive, for at least the following reasons.

First, contrary to the last full paragraph on page 2 of the applicant's response, and as clearly explained in the statement of the rejection of independent claim 26, Cherne in combination with Han results in a thin film transistor comprising, inter alia, a silicon film in which a channel region is formed, the channel region including an extension in a channel width direction, and a gate electrode exhibiting higher thermal conductivity than that of the silicon film, the gate electrode formed over the channel region and covering up the extension, as claimed in independent claim 26.

Furthermore, contrary to the first full paragraph on page 3 of the applicant's response, the examiner's interpretation of Cherne and Han is entirely correct. Indeed, it is the applicant's interpretation of Cherne which is incorrect. Specifically, contrary to

the applicant's allegation that Cherne does not disclose a thin film transistor having a gate electrode formed over the channel region and covering up the extension, as claimed in claim 26, Cherne does, in fact, disclose a thin film transistor having a gate electrode formed over the channel region and covering up the extension, as clearly explained in the statement of the rejection of claim 26. Again, see Cherne's Figs. 3-4 and note gate electrode 21 formed over the channel region 14 and covering up channel extensions 31 and 32 (much like gate electrode 15 in this application's Fig. 3 is formed over channel region 17 and covers up channel extensions 171).

Furthermore, even though the applicant's argument in the second full paragraph on page 3 of the response is moot (because Cherne's gate electrode 21 does cover extensions 31 and 32, as explained above), the applicant's "Without being covered up by the gate electrode, the extension does not work as a radiator," argument is technically incorrect in any event, as evidenced by the disclosure. Specifically, the silicon channel extensions radiate heat in and of themselves, regardless of whether they are covered by the gate electrode. See the description of Fig. 3, to which independent claim 26 is directed, at pages 12-13 of the specification. See also the description of Fig. 4's heat radiating source/drain extensions 123, which are not covered by gate electrode 15, at pages 13-14 of the specification.

Furthermore, contrary to the applicant's argument in the last full paragraph on page 3 of the response, Cherne's silicon channel extensions 31 and 32 do "work as a heat radiator," much like the disclosed silicon channel extensions 171 (Fig. 3) and silicon source/drain extensions 123 (Fig. 4) "work as a heat radiator" (i.e., by virtue of the increased silicon surface area - again, see the specification at pages 12-14).

Furthermore, contrary to the applicant's argument in the second full paragraph



on page 4 of the response, Han's teaching of forming a thin film transistor's gate electrode of polysilicon or metal stands on its own and has nothing to do with "improving a ratio of an ON electric current and on OFF electric current" (indeed, the portion of Han relied upon by the examiner in the statement of the rejection is Han's description of its Prior Art Fig. 1).

Furthermore, and also contrary to the applicant's argument in the second full paragraph on page 4 of the response, the applied prior art references need not discuss or suggest the problem the inventor attempted to solve. See *In re Dillon*, 919 F.2d 688, 693 and 694, 16 USPQ2d 1897, 1901 and 1902 (Fed. Cir. 1990) (*en banc*), *cert. denied*, 500 U.S. 904 (1991).

Furthermore, and still contrary to the applicant's argument in the second full paragraph on page 4 of the response, the examiner is not using impermissible hindsight to combine Han with Cherne. Rather, as clearly explained in the statement of the rejection, "Han et al. teach forming a thin film transistor's gate electrode of polysilicon or metal (see column 1, lines 50-60) ... It would have been obvious to one skilled in this art to form Cherne et al's thin film transistor's gate electrode 21 of metal, rather than polysilicon, because metal and polysilicon are used interchangeably for a thin film transistor's gate electrode, as taught by Han et al."

Furthermore, contrary to the applicant's argument on page 4 of the response, the third criterion of a prima facie case of obviousness according to MPEP Section 706.02(j) is not "The prior art reference must teach or suggest all claim limitations, but rather "The prior art reference (or references when combined) must teach or suggest all the claim limitations."

Furthermore, contrary to the applicant's argument in the last full paragraph of

page 4 of the response, the actual first and third requirements of MPEP §706.02(j) have been met by the rejections maintained in this Office Action. Specifically, the statements of those rejections clearly explain both the motivation for combining the references and how the combined prior art references (not Cherne alone) disclose all the claim limitations.

The applicant does not specifically argue the maintained rejection of claims 35, 36, 38, 40-42 and 58 under 35 U.S.C. §103(a) as obvious over Cherne et al. together with Han et al., Kerber et al. and Koyama et al., but instead apparently relies on its arguments with respect to the maintained rejection of claims 26, 30, 31, 33 and 34 under 35 U.S.C. §103(a) as obvious over Cherne et al. together with Han et al. and Kerber et al., which arguments have been demonstrated to be without merit.

Applicant's amendment necessitated the new ground of rejection. Accordingly, **THIS ACTION IS MADE FINAL.** See M.P.E.P. §706.07(a). Applicants are reminded of the extension of time policy set forth in 37 C.F.R. §1.136(a).

**Applicant's reply to the final rejection must include cancellation of, or appeal from the rejections of, each rejected claim (i.e., the applicant's reply to the final rejection must include cancellation of, or appeal from the rejections of, claims 26, 30, 31, 33, 34-36, 38, 40-42, 58 and 61). 37 CFR 1.113.**

**The applicant should file an amendment under 37 CFR 1.116 canceling finally rejected claims 26, 30, 31, 33, 34-36, 38, 40-42, 58 and 61, and not adding any claims, so that the application would apparently be in condition for allowance, with the allowed claims consisting of claims 25, 39, 43, 44, 47-57, 59 and 60.**

**A SHORTENED STATUTORY PERIOD FOR RESPONSE TO THIS FINAL**

ACTION IS SET TO EXPIRE THREE MONTHS FROM THE DATE OF THIS ACTION. IN THE EVENT A FIRST RESPONSE IS FILED WITHIN TWO MONTHS OF THE MAILING DATE OF THIS FINAL ACTION AND THE ADVISORY ACTION IS NOT MAILED UNTIL AFTER THE END OF THE THREE-MONTH SHORTENED STATUTORY PERIOD, THEN THE SHORTENED STATUTORY PERIOD WILL EXPIRE ON THE DATE THE ADVISORY ACTION IS MAILED, AND ANY EXTENSION FEE PURSUANT TO 37 C.F.R. §1.136(a) WILL BE CALCULATED FROM THE MAILING DATE OF THE ADVISORY ACTION. IN NO EVENT WILL THE STATUTORY PERIOD FOR RESPONSE EXPIRE LATER THAN SIX MONTHS FROM THE DATE OF THIS FINAL ACTION.

Registered practitioners can telephone examiner Prenty at (703) 308-4939. Any voicemail message left for the examiner must include the name and registration number of the registered practitioner calling, and the application's Serial Number. Technology Center 2800's general telephone number is (703) 308-0956.

*Mark Prenty*  
Mark V. Prenty  
Primary Examiner